In addition to reading the textbook thoroughly, working through the self-tests questions (the solutions to which are in the textbook) and the programming projects at the ends of the chapters, and reviewing the slides used during lectures, here are some questions you should be able to answer and concepts you should know for the exam:

1. What are the phases of a typical software development life cycle?
2. What are the various steps a programmer should use in thoroughly testing and debugging a program?
3. What is a test plan? How would you use it to thoroughly test a program?
4. What is meant by incremental development / stepwise refinement?
5. What are preconditions and postconditions? Why are they used? How do (should) they affect code?
6. What is the signature of a method? Why do we care?
7. What is an abstract data type? Of what is an ADT composed?
8. What is meant by “object oriented”? How is an object related to the concept of an ADT? How is it different?
9. Describe the three basic concepts that are fundamental to object-oriented programming.
10. Write client-level code to test every method of the Throttle class.
11. Add a toString( ) method to the Throttle class.
12. What is the signature of the Throttle method shift( )?
13. What information is being hidden in the Throttle class? How is this done (i.e. what is the mechanism in Java that makes it possible to hide information?)?
14. What is the encapsulation mechanism of Java? How is it being used in the Throttle class?
15. What are the instance variables of the Throttle class?
16. What is meant by the term “accessor method”? What are the accessor methods of the Throttle class?
17. What is meant by the term “modifier method”? What are the modifier methods of the Throttle class?
18. Why are accessor and modifier methods used instead of having the client program access the instance variables directly?
19. Write appropriate clone( ) and equals( ) methods for the Throttle class. Be sure to use the patterns described in Ch. 2.
20. Give an example of the usefulness of the information hiding principle.
(21) What happens when you test two objects for equality using the == operator?

(22) Suppose that a Mysterious Benefactor provides you with the Bag class, but you are only permitted to read the documentation. You cannot read the class implementation or .java file. Can you write a program that uses the Bag data type?

(23) Describe in words how a value is deleted from an IntArrayBag object.

(24) In the IntArrayBag implementation, why is there a need for the manyItems instance variable?

(25) Why are instance variables never given initial values as part of their declarations?

(26) What is the complexity (i.e. the $O(\ )$ notation) of the countOccurences( ) method of the IntArrayClass? Explain.

(27) What is the complexity of the update( ) method of the Life assignment? Explain.

(28) Put the following complexities in order from fastest to slowest: $O(n \log n)$, $O(n^3)$, $O(1)$, $O(2^n)$, $O(n)$, $O(\log n)$, $O(n^2)$.

(29) What does it mean to describe the complexity of a particular algorithm as $O(n^2)$? Why do we bother to describe an algorithm in this way, i.e. in what way is the complexity description useful?